dogs can be successfully used to find flight recorders that are literally painted with scent?

Squalene has been contemplated for other uses too. As part of a counter-terrorist operation, it has been suggested that border areas be sprayed with squalene. An intruder who crosses through the area would pick up the oily substance and then be more easily tracked by the dogs as he penetrates into the neighboring countryside. The U.S. Army has evaluated such a proposal and found that the material could be sprayed from airplanes in much the same way as crops are dusted.[5] Furthermore, they found that, like the fingerprinted slides, the material will remain active for many days and through a diversity of weather conditions. It would certainly appear to be a viable approach for improving the tracking ability of the dog, particularly through densely populated areas. The major concern would be to ensure that the investigating patrol does not become contaminated with the material and spread conflicting tracks of squalene all over the area to be explored.

Perhaps the most bizarre use of an odor-tagging technique involves cockroaches and sex odors. The basic paradigm is structured around the use of a highly volatile substance that the female cockroach exudes and which causes a flurry of sexual activity in her male counterpart. Such substances are called pheromones.

Pheromones are powerful sources of communication by means of chemical signals transmitted from one member of a species to another. Frequently the information is conveyed in volatile molecules that are exuded by the sender and picked up by an olfactory sensor on the receiver. What characterizes pheromone communication systems is their exquisite sensitivity and the complete specificity of the information that they convey. Only the most microscopic amount of the pheromone has to be released in order for a detection to be made. Once the detection is made, it triggers off a chain of species-specific, survival-related responses. Most pheromone systems are intimately related to sexual and reproductive behavior, though there is also evidence for fear pheromones, alarm pheromones, as well as others.

A classic example of the operation of a pheromone-behavior system is seen in the mating behavior of the silk moth.[6] The male silk moth has a relatively huge pair of bushy antennae, almost resembling a set of hairy wings. These structures make up the olfactory network of the moth. What is most peculiar about this network is that 70 percent of the thousands of receptors are sensitive to one, and only one, volatile chemical. This substance, officially known as 10-trans-12-CIS-HEXADECADIEN-1-OL, but thoughtfully shortened to bombycol, is produced by the female silk moth.

When the virgin female moth is ripe for fertilization, she waits on some comfortable leaf and dispenses minute amounts of her attractive perfume. The molecules of bombycol are carried downwind. When, by chance, they are caught in the antennae of the male moth, they cause a pattern of neuronal activity which stimulates the male moth to fly upwind. Studies of the electrophysiological activity of this extraordinary sensing system indicate that one molecule of bombycol is sufficient to produce a neural reaction. Thus, the male moth may receive his first clue of the presence of a potential mate when she is still several miles distant from him. Traveling upwind in response to continued stimulation by the pheromone eventually brings him close enough to the waiting female so that he can begin responding directionally on the basis of differential gradients of concentration of the pheromone.

The sexually attracting pheromones of insects have been used in various programs for pest control.[7] The war against the gypsy moth, a particularly destructive pest, has been successfully waged by using pheromone-baited traps. The gypsy moth was introduced into the New England region of the United States in 1869 in an attempt to produce a hardy new breed of silkworms by crossing it with the silkworm moth. Unfortunately, some of the eggs or caterpillars escaped, and the gypsy moth population grew at an astronomical rate. The hairy caterpillars devour huge quantities of green leaves and, unchecked, would result in millions of dollars of damage each year. After thirty years of extensive investigation at the U.S. Department of Agriculture, the chemical structure of the gypsy moth attractant was identified. The abdomens of a half million female moths produced less than one thousandth of one ounce of the substance. In further laboratory tests it was found that as little as a trillionth of a microgram of the substance would cause the male moth to curve his abdomen and to respond with copulatory movements. Once having isolated the pure substance, a very similar product could be synthesized in large enough quantities so that it could be used in the field to bait thousands of traps.

The female cockroach, like the gypsy moth, secretes a chemical substance which excites and attracts the male of the species. The presence of a very small quantity of the pheromone in a room is enough to cause the male cockroach to very noticeably increase his activity. In fact, if the cockroach is kept in a small cage, he exhibits severely agitated behavior in the presence of the female pheromone.

The sex attractant pheromone of the American cockroach proved to be difficult to obtain. In the laboratories of the U.S. Department of Agriculture, ten thousand virgin female cockroaches were placed in an empty milk can. A continuous stream of air was passed through the can, and the output distilled. Over a nine-month period, only 12.2 milligrams of the attractant was obtained.[8]

The story has been told to me that the CIA, at least once, used this pheromone. Whether they used some of this small output or had their own stable of cockroaches to milk was not revealed.

According to the story, they were interested in discovering whether a particular individual, let's say a Mr. Green, was visiting the Fifth Avenue apartment of a prominent New York socialite who was believed to be serving as a drop-off for a group of foreign agents. A CIA agent followed Mr. Green into the subway and, while being crushed against him in the rush-hour crowd, deposited a small smear of the "cockroach perfume" on his jacket. Thereafter, the agents stopped following him. On the following day, however, when the socialite was away from her apartment, the CIA entered it with a cage of virile male cockroaches. The caged roaches stampeded, and the agents had their "proof" that Mr. Green recently had been in the apartment.

Conceivably one also could employ this technique in reverse. Instead of being interested in trailing the behavior of one individual, one might ask a broader question, such as which one of several people attended a Ku Klux Klan meeting at the local Grange Hall in Smithfield, North Carolina. Prior to the meeting, or during the meeting itself, the hall could be sprayed with the pheromone. Afterward one could go, one by one, to the list of possible attendees and apply the cockroach activity test. The same technique can be employed with the common bedbug, a species more suitable for a white-sheeted KKK environment.

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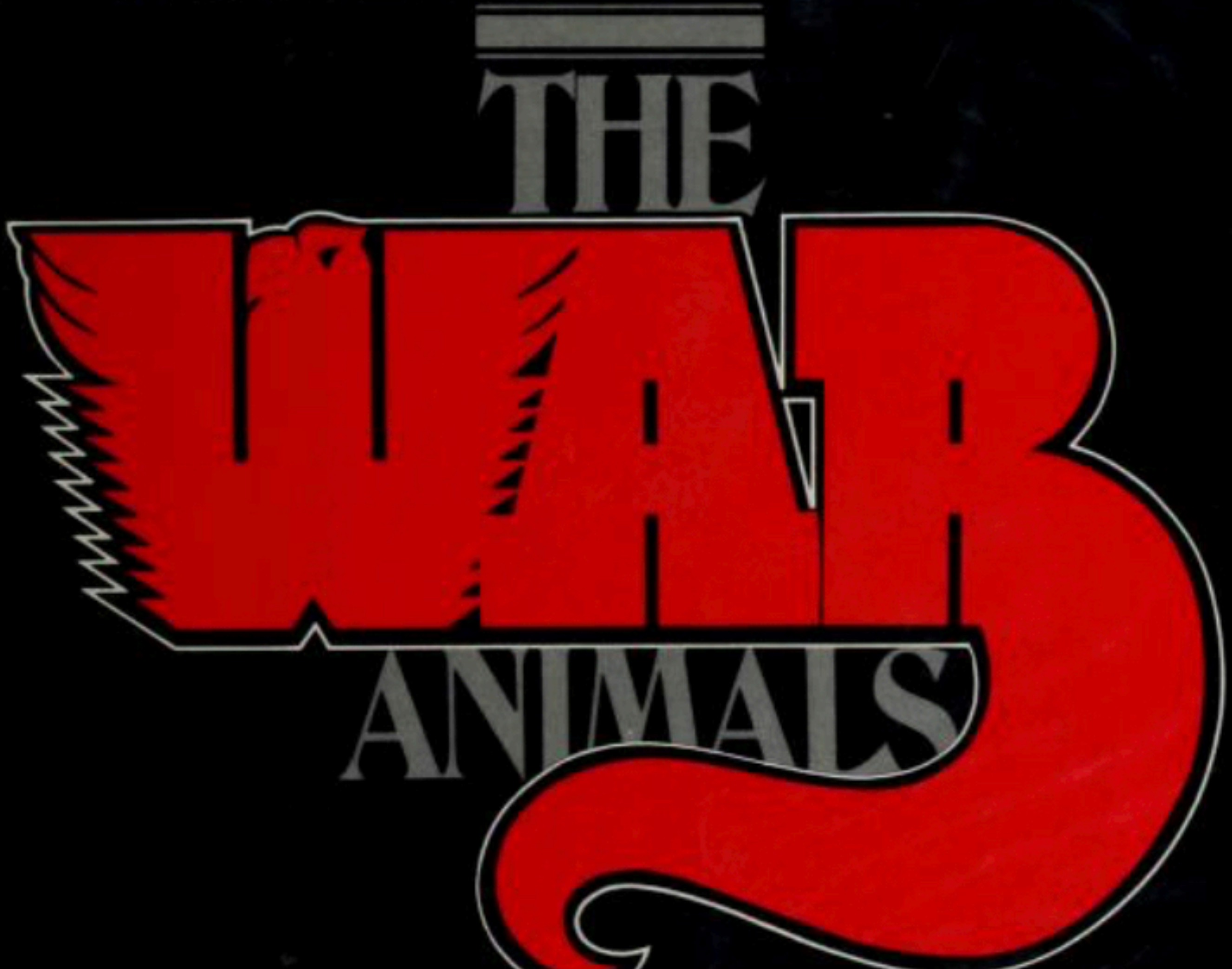
THE WAR ANIMALS



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